

Compact Water Electrolyzer for Low-Gravity Environments, Phase II

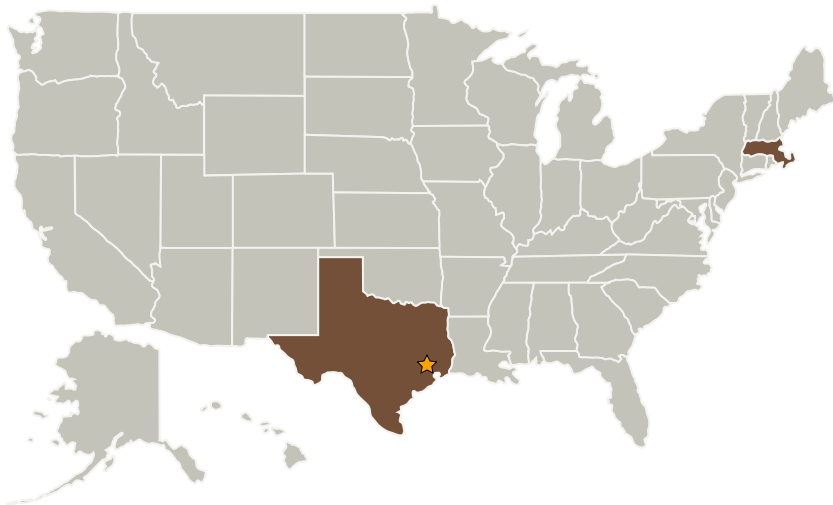
Completed Technology Project (2005 - 2007)



Project Introduction

NASA uses a number of water electrolysis units for generating oxygen and hydrogen gas for space applications. These missions range from generating propellants to supplying oxygen to crew and habitat. Consequently, the electrolyzer systems employ a variety of designs and system approaches that can generate high pressures or product gases with varying degrees of moisture, however, most of these approaches result in heavy and bulky systems. A new water electrolyzer was developed by MicroCell Technologies that allows pressurized gas to be generated in a lightweight and compact design. In a Phase I SBIR program, we demonstrated the feasibility of the electrolyzer to generate pressurized oxygen and hydrogen gas in a compact and lightweight electrolyzer design that can operate in a passive mode without requiring water pumps. Based on these results, we propose to scale the process in a Phase II program to a rate of 0.5 kg O₂/hr in a device with a mass of 1000 g and a volume of 300 cc. This translates into high power densities of 6 kW/kg and 18 kW/liter, competitive metrics for an electrolyzer that can also generate high pressure to 2000 psi in a passive balance of plant approach.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Reactive Innovations, LLC	Supporting Organization	Industry	Westford, Massachusetts

Primary U.S. Work Locations

Massachusetts	Texas
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.1 In-Situ Resource Utilization
 - └ TX07.1.3 Resource Processing for Production of Mission Consumables